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Making the Decision: Pollution Prevention (P2) Equipment Evaluation, Procurement, Implementation and Monitoring

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Introduction

You have developed your P2 Plan and it looks great! You have placed it neatly on the shelf, ready to be shown to whoever might ask if you have one. So, now what? Well, it probably makes a dandy reference of information and ideas, but how do you go about implementing the recommendations in the Plan? Simply put, what does it take to put your P2 Plan into action? We will take a look at some of the decision making and lessons learned at NAS Patuxent River.

How do you decide which P2 option is best for your needs? Some fundamental questions should first be answered. What is your primary objective? Is it waste reduction or saving money? Are you planning to select the best P2 options for achieving your waste reduction goals, or are you limited to selecting those options that show significant cost savings? Once you have made those decisions, there are several questions to consider to help you prioritize the options, put them into operation, and evaluate the results.

1) What processes contribute to your waste streams and which one should you tackle first?
2) What are your P2 options and how do you select the right ones?
3) How do you procure the selected P2 option, and what preparations should you make?
4) How do you know the P2 solution is doing the job and is a good value?

Note: The Flow chart in Figure 1 can help you with your P2 equipment implementation program.

Check Out Your Waste Streams and Prioritize Your Waste Reduction Effort

What processes contribute to your waste streams, and which one should you tackle first? One of the first steps in developing a successful P2 Program is to identify the types and amounts of each waste stream. Then determine the processes and activities that generate those wastes. We considered three major categories of waste: hazardous waste, non-hazardous waste, and municipal solid waste (MSW).

The hazardous waste category may be your first priority for waste stream reduction due to safety, health, environmental and disposal cost considerations. Although a material may not be a hazardous waste as it enters a process, exposure to other materials during the process may render it hazardous. Consider starting with a less hazardous material (e.g., using solvents with a high flash point) to reduce the likelihood that you will have to dispose of a hazardous waste at the end of the process. Find out which processes contribute the most to your waste stream and see which activities are the primary users of those

processes. Try to tackle the largest waste stream first.

Your non-hazardous waste category, which could include oil, antifreeze and alkaline batteries, may rank second in priority to hazardous waste for waste stream reduction. However, there could be exceptions. Perhaps you have a non-hazardous waste that is on the Toxic Release Inventory (TRI) list. Reducing that chemical has suddenly moved higher on the priority list. The concerns are environmental considerations and cost associated with disposal. Methods to reduce this waste stream may include substitution, reuse, and recycling. Again, try to reduce the largest and most toxic waste stream first.

The third category for waste reduction will likely be your trash disposal. Methods to reduce this waste generally require recycling. Find out, through waste characterization, what is recyclable in your waste stream (e.g., cardboard, paper, plastics, metal and glass). Since organic waste is generally a large waste stream component, consider composting at your facility. Determine what your local recycling market can support, and arrange to divert your waste to that market.

After the waste streams and the corresponding activities that yield them have been identified, the P2 team must prioritize waste reduction efforts. That priority can be established by a number factors. For example, the substance may be considered a particular health risk (TRI chemical); it may make up a large portion of the waste stream; it could be economically desirable; or it just may be a simple program to implement (e.g., properly segregating and labeling waste oil to allow recycling through a refinery). What is important at your base? At NAS Patuxent River, our first priority was to reduce hazardous waste and reduce TRI chemicals exceeding 10,000 lb per year. We considered ways to reduce all waste streams but emphasized the largest waste streams as most important to the success of the program.

Examples: Targeting Waste Streams

1. When Air Operations replaces the ethylene glycol (our No. 1 TRI chemical) contained in the arresting gear fluid storage tanks, the arresting gear is disconnected and the 300-gallon storage tank contents are emptied into six 55-gallon drums. The spent ethylene glycol is then disposed. The cost of this operation for all eight tanks was calculated to be $15,057. Is there a way to reduce this waste, and how cost effective is it?

2. Abrasive blasting for depainting is the largest recurring source of hazardous waste at Patuxent River Naval Air Station. The primary type of media used is a Plastic Media Bead (PMB) and it accounts for up to 40,000 pounds of waste per year. Can anything be done to eliminate or reduce this waste?

Research Your P2 Equipment Options & Make a Decision

What are your P2 options, and how do you select the right ones? Now that you have figured out the processes and waste streams to target, it's time to check into potential waste reduction alternatives. Often more than one solution exists, and the relative merits of each should be considered. For instance, should used oil be transported to a refinery or can it be recycled on site and used as a diesel fuel additive? Your P2 team must research possible solutions and alternatives and use that information as the basis for a reasonable cost-benefit analysis. The research does not end here; new information can turn up to alter the course of a given procurement.

Example: Flexible Decision Making

> After researching and analyzing the solvent recovery options, we decided to purchase a distillation unit to separate and recycle spent solvents on site. While the unit was in procurement, two issues came up and caused us to reconsider the decision. We could not be certain that recycled fluids would meet original performance specification, and we found out that a similar unit had exploded at another facility. We decided to cancel this order and shift to filtration devices for use on solvent

parts washers and paint gun washers to extend fluid life.

It's a good idea to have a well-researched "wish list" of potential P2 options for purchase. If funding becomes available, particularly at the end of a fiscal year, your "shopping list" may give you the edge when competing for scarce funding resources.

Keep informed. New techniques are constantly being devised to reduce pollution. Keep abreast of the latest developments through the P2 Opportunity Handbooks, conferences, magazines, the Internet, vendor literature and the people in your shops.

After an idea has been researched and is found to be cost effective, how do you go about selecting the equipment? The team should first consult the *Tri Service P2 Opportunity Handbook* and the *Navy P2 Equipment Handbook.* Both are available via the Internet. These documents identify common waste streams and corresponding P2 process and equipment options to consider for implementation. Using established P2 options can speed your research, stimulate ideas, and may make the procurement process a little easier. Your P2 team can expand your research by consulting with existing users of the equipment, manufacturers, vendors, and trade publications for more up-to-date information on the latest practices and equipment. Discussing the new equipment with the planned users of the equipment can yield a wealth of insights and help gain acceptance of the planned changes. This extra effort should pay off in the long run by giving you a better product and a satisfied user.

Once you have decided on the type of P2 equipment to do the job, it's time to figure out which model to purchase. This may or may not be answered by the cost study performed in the research stage. The P2 team may have to prepare further cost-benefit analyses to determine the most economical model to purchase. Keep in mind that the most cost effective solution may not be the most environmentally desirable or have the biggest impact on waste stream reduction. Here is where your P2 team must decide what is more important.

Examples: Choosing The Best Buys

1. We wanted to recycle 8 tanks (about 2,400 gallons) of arresting gear fluid. We identified several manufacturers that sell antifreeze recyclers. One of the selected models could only process 3.2 gallons per hour and was deemed inadequate. The following table illustrates a cost comparison between the remaining prospective models. Having pre-determined the present cost of changing antifreeze, it can be seen that antifreeze recycling is cost effective and which unit is the best buy. At first glance you might choose option "A" for having the quickest initial cost recovery, but actually option "C" gives the best value for its largest recurring savings.

Table 1. Solvent Recycling Equipment Comparison

Manufacturer	A	B	C
Type of Recycling	Upgrade Existing Equipment	Ion Exchange	Chemical Pretreatment and Filtration
Process Rate per Hour	55 gallons	100 gallons	100 gallons
Initial Procurement Cost	$162	$9,995	$2,500
Material Cost per Changeout	$5,840	$7,787	$1,237
Disposal Cost per Changeout	$209	$209	$84
Labor Cost per Changeout	$2,951	$374	$2,452
Total Cost per Changeout	$9,000	$8,370	$3,773
Current Changeout Costs (8 tanks)	$15,057	$15,057	$15,057

Savings per Changeout (8 tank)	**$6,057**	**$6,687**	**$11,284**
Savings per Changeout (1 tank)	**$757**	**$836**	**$1,411**
Initial Cost Recovery (# tanks)	**1st tank**	**12th tank**	**2nd tank**

2. A firm that has developed a process whereby the plastic media bead (PMB) used in abrasive blasting is recycled into cultured marble products, such as sinks and countertops. The following table illustrates the cost comparison between the present disposal method and the proposed method.

Table 2. Projected Additional Cost if PMB Recycling Had Been Implemented

OPERATING YEAR	1994	1995	1996
CURRENT METHOD:			
PMB Disposal (lb.)	15,800	30,097	41,539
Media Purchase	$20,224	$30,699	$61,062
Media Disposal	$7,426	$14,146	$11,631
Steel Drum	$1,080	$2,040	$2,800
Delivery/Pickup	$451	$451	$451
Placarding	$24	$46	$63
TOTAL OPERATING COSTS	**$29,205**	**$47,382**	**$76,007**
PROPOSED METHOD:			
Media Lease	$33,180	$61,699	$85,155
Media Disposal	N/A	N/A	N/A
Steel Drum	N/A	N/A	N/A
Delivery/Pickup	N/A	N/A	N/A
Placarding	N/A	N/A	N/A
TOTAL OPERATING COSTS	**$33,180**	**$61,699**	**$85,155**
ADDITIONAL COSTS	**$3,975**	**$14,317**	**$9,148**

The economical choice would be to continue the current practice. However, our P2 Committee decided that the reduction in hazardous waste and the environmentally friendly method of recycling (plus the positive public recognition benefit) were worth spending the extra funds. Although not a P2 Equipment option, this scenario shows an example of how it might make sense to select an option that may never pay for itself in dollars.

Buy Your P2 Equipment & Get Ready For Delivery

How do you procure your selected P2 option and what preparations should you make? Now that you have decided what to buy, how do you get it into the users' hands? Do you have funds available for the purchase or do you need to request funds from a higher authority? You may need to project a payback period to justify the purchase.

First check out the Navy P2 equipment procurement program. This is a program through which the Navy has already researched the P2 benefits of selected equipment and a base can take advantage of the volume discount, installation, training and logistics support. If you are procuring directly from the manufacturer, you may need to draft a contract, sole source justification, or list three competitive vendors.

Quite often your equipment purchase will require some sort of site preparation. This can range from simply having a place to store it if the equipment is a portable device, to providing concrete slabs, shelter, electrical power, containment, or plumbing. In any event, this is an issue your P2 team should consider. You must see to it that the appropriate personnel (e.g., electricians, carpenters, plumbers) prepare the physical site. Make sure that you organize any necessary training before and after the equipment's arrival.

Invariably there is accompanying paperwork that needs to be documented when the equipment arrives on site. You will need to keep track of the placement of each piece of equipment.

KEEP YOUR P2 EQUIPMENT OPERATIONAL & TRACK ITS PERFORMANCE

How do you know the P2 equipment is doing the job and is a good value? Consider building a database to measure the performance of each piece of equipment. Once the equipment is in place, you need to monitor it to evaluate and maintain its effectiveness. Consistent monitoring can detect problems early enough to avoid excessive down time and can provide data that can help you ascertain the cost effectiveness of the program. The monitoring program requires the P2 team to establish a rapport with the individuals who are responsible for operating and maintaining the equipment. They are an invaluable resource to consult when determining the equipment's capabilities. The comments and the data they provide are critical to quantifying and assessing the results of the P2 initiative. You can use this information to help you with future procurement decisions.

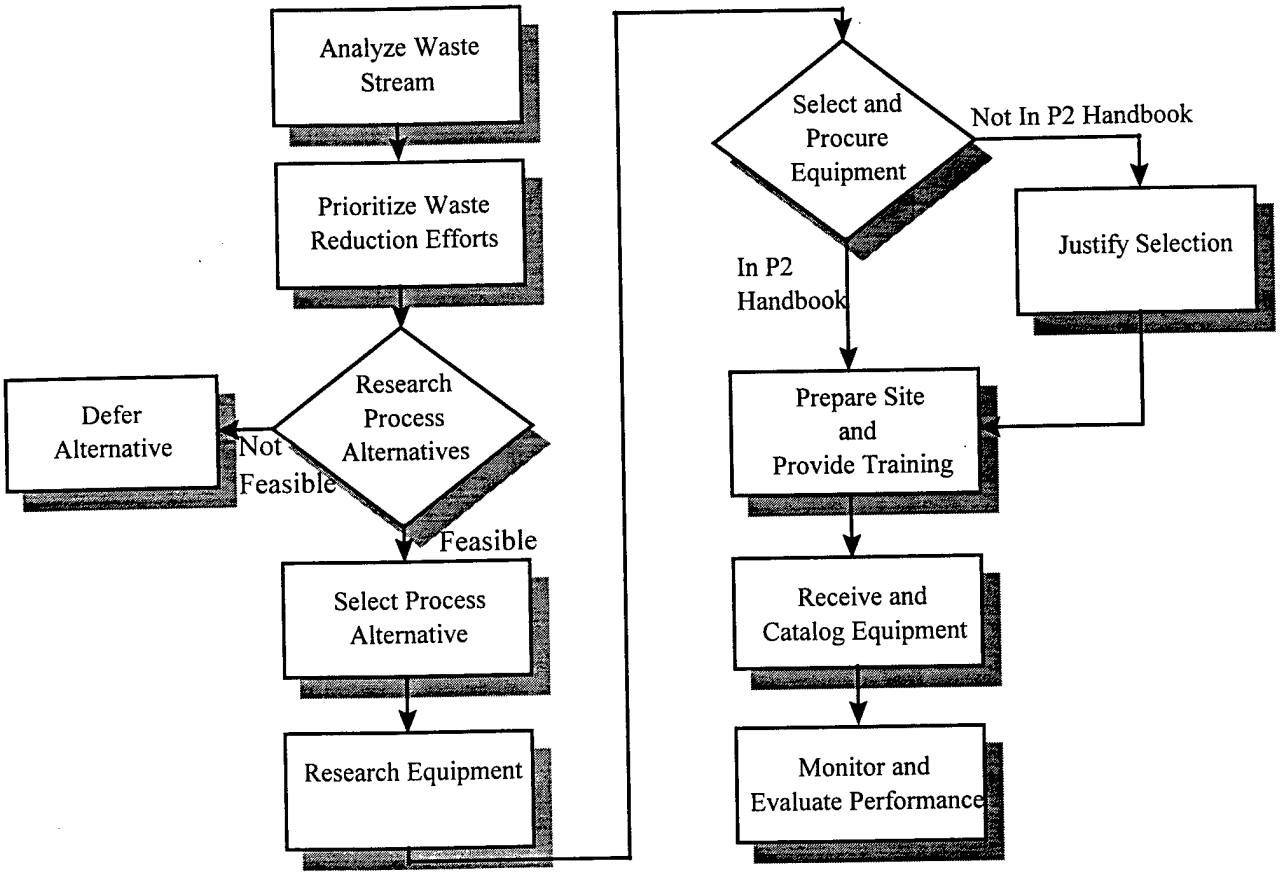

Figure 1. P2 Equipment Implementation Flowchart

ROADBLOCKS TO IMPLEMENTATION

Every new program meets with resistance of some sort, and pollution prevention is no exception. Human nature, being what it is, resists change. There undoubtedly will be individuals with an "If it isn't broken, don't fix it" attitude to overcome. It is part of the P2 team's job to persuade these individuals that there is a better way to complete their activities. Typically, there are other benefits besides pollution prevention (e.g., safer to use, time savings, cost savings) that can motivate these individuals to try a new approach and

help it succeed.

Of course there is the ever present question of spending. It will be much easier to gain funding if your P2 team can propose a solution that is economically beneficial. However, not all pollution programs have a dollar benefit associated with them. Some programs need to be implemented because they are mandated, others because they reduce health risks, or simply because they are in the public's interest. In any event, it is the P2 team's responsibility to try to present the most cost effective "best value" solution.

CONCLUSION

Your P2 team will make your Pollution Prevention Program successful through a concerted effort to implement recommendations in your P2 Plan and evaluating the results. Your P2 team will carry out this responsibility by identifying the key wastes, developing a cost effective method to reduce them, initiating and implementing the solution, and monitoring and evaluating the program's performance. With a vision to keep your P2 Program on track, you will reach your P2 goal through persistence and a determination to make it work.